



## DEPARTMENT OF THE INTERIOR

### Fish and Wildlife Service

#### 50 CFR Part 17

[Docket No. FWS-R4-ES-2020-0125; FF09E22000 FXES1113090FEDR 223]

RIN 1018-BE41

### Endangered and Threatened Wildlife and Plants; Removing *Adiantum vivesii* From the Federal List of Endangered and Threatened Plants

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Final rule.

**SUMMARY:** We, the U.S. Fish and Wildlife Service (Service), are removing the plant *Adiantum vivesii* (no common name) from the Federal List of Endangered and Threatened Plants (List). This determination is based on a thorough review of the best available scientific and commercial data indicating that *Adiantum vivesii* is not a distinct species, but rather a sterile hybrid that does not have the capacity to establish a lineage that could be lost to extinction. Here, we have determined that *Adiantum vivesii* is not a discrete taxonomic entity and does not meet the definition of a species as defined under the Act, and that its original listing was based on data or interpretations of data that were in error; therefore, we are delisting it.

**DATES:** This rule is effective [INSERT DATE 30 DAYS AFTER DATE OF FEDERAL REGISTER PUBLICATION].

**ADDRESSES:** This final rule, supporting documents, and the public comments received on the proposed rule are available on the internet at <https://www.regulations.gov> under Docket No. FWS-R4-ES-2020-0125.

**FOR FURTHER INFORMATION CONTACT:** Edwin Muñiz, Field Supervisor, Caribbean Ecological Services Field Office, P.O. Box 491, Boquerón, PR 00622; [Caribbean\\_es@fws.gov](mailto:Caribbean_es@fws.gov); telephone 787-405-3641. Individuals in the United States who are deaf, deafblind, hard of

hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.

## **SUPPLEMENTARY INFORMATION:**

### **Previous Federal Actions**

On June 9, 1993, we listed *Adiantum vivesii* as an endangered species (58 FR 32308), due primarily to its limited distribution and low numbers of individuals.

We completed two 5-year reviews for *Adiantum vivesii*, the first on June 10, 2008 (see the announcement initiating the review at 70 FR 53807, September 12, 2005), and the second on September 25, 2018 (see the announcement initiating the review at 82 FR 29916, June 30, 2017). Both 5-year reviews recommended delisting due to the entity not meeting the Act's definition of a species; they found that the original data used at the time the entity was classified was in error. Peer reviewer comments received on the 5-year status review (2008) were part of our thorough review of the best available scientific and commercial data used to make our determination.

On July 30, 2021, we proposed to delist *Adiantum vivesii* because it is not a listable entity under the Act; our proposal further explained that the original data used at the time the species was classified were in error (86 FR 40996). In that document, we requested information and comments from the public and peer reviewers on our proposal to delist *Adiantum vivesii*.

### **Summary of Changes from the Proposed Rule**

There are no changes in this final rule from our proposed rule (86 FR 40996; July 30, 2021) based on the comments we received and that are summarized below under **Summary of Comments and Recommendations**.

### **Background**

#### *Regulatory Framework*

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an endangered species or a threatened species. On July 5, 2022, the U.S. District Court for the Northern District of California vacated regulations that the Service (jointly with the National Marine Fisheries Service) had promulgated in 2019 (*Center for Biological Diversity v. Haaland*, No. 4:19-cv-05206-JST, Doc. 168 (*CBD v. Haaland*)). As a result of that vacatur, regulations that were in effect before those 2019 regulations now govern listing and critical habitat decisions. Our analysis for this decision applied those pre-2019 regulations. However, given that litigation remains regarding the court's vacatur of those 2019 regulations, we also undertook an analysis of whether the decision would be different if we were to apply the 2019 regulations. We concluded that the decision would have been the same if we had applied the 2019 regulations. The analysis based on the 2019 regulations is included in the decision file for this decision.

The following discussion contains information that was presented in the proposed rule to delist *Adiantum vivesii* (86 FR 40996; July 30, 2021). A thorough discussion of the species' description, habitat, and life history is also found in that proposed rule.

#### *Entity Description*

*Adiantum vivesii* was found growing in colonies (clusters) where the rhizome (rootstock or underground stem) spreads horizontally. The fronds (leaves) are distichous (arranged in one plane) and erect-spreading with broad and irregular lance-oblong blades. The blades have two or three alternate or occasionally subopposite pinnae (segment of leaf), with a larger terminal pinna. The terminal pinnae are stalked often somewhat inequilateral with approximately 10 to 13 pairs of alternate, narrowly oblong-falcate pinnules (smaller segments of a leaf), shaped unequally cuneate at the base. The irregularly branched stalks are lustrous purple-black with hairlike scales. The rachis (axis of a fern leaf) and costae (central vein of a leaf) are more densely covered with hairlike scales than the stipe. The outer sterile margins of the pinna are irregularly serrulate (serrated teeth), and the tissue is dull green on both sides. Five elliptic to linear sori (sacks of

spores) are borne along the basal half of the acroscopic (facing the apex) margin. The sori are also close or contiguous, but remain distinct, and the indusium flap (tissue covering the sori) is gray-brown and turgid, with an erose (irregular) margin (Proctor 1989, p. 140; USFWS 1995, pp. 1–2).

### *Distribution and Habitat*

*Adiantum vivesii* was found in the limestone or karst region of northwestern Puerto Rico. This region is underlain by limestone rocks of the Oligocene or Miocene age. Topography varies throughout the karst region, from extremely rugged to gentle rolling hills. Canyons, sinkholes, and subterranean rivers, as well as these rolling hills, are the most common features of the region. Soils in the limestone hills are shallow, well-drained, alkaline, and interspersed between limestone outcrops (Lugo *et al.* 2001, pp. 13–26; USFWS 1995, pp. 6–7). *Adiantum vivesii* occurs within the semi-evergreen seasonal forests of the subtropical moist forest life zone (Ewel and Whitmore 1973, p. 20). This life zone, which covers 58 percent of the total area of Puerto Rico and the U.S. Virgin Islands, is delineated by a mean annual rainfall of between 1,000 to 1,100 millimeters (mm) (40 to 44 inches (in)) and about 2,000 to 2,200 mm (80 to 88 in) and a mean temperature between about 18 and 24 degrees Centigrade (64.4 and 75.2 degrees Fahrenheit) (Ewel and Whitmore 1973, p. 20). *Adiantum vivesii* occurs in a deeply shaded hollow at the base of a privately owned limestone hill in the municipality of Quebradillas (USFWS 1995, p. 7).

When the species was listed in 1993, it was known from only one population, which was estimated at 1,000 plants or growing apices by Proctor (1991, p. 5). The population was later documented in 2000 at the same location occurring in an area of 21 meters (m) by 10 m (68.9 feet (ft) by 32.8 ft) by Sepúlveda-Orengo (2000, p. 21). In the vicinity of this area, eight other species of the genus *Adiantum* were found (*A. cristatum*, *A. fragile*, *A. latifolium*, *A. melanoleucum*, *A. pulverulentum*, *A. tenerum*, *A. tetraphyllum*, and *A. wilsonii*). The fern *Adiantum tetraphyllum* was growing intermixed within the area occupied by *Adiantum vivesii*

(Sepúlveda -Orengo 2000, p. 22). Surveys conducted in 2017 at the type locality (the location where the specimen was first identified) were unable to identify material that morphologically matched the original type specimen (despite similarities), nor any clonal stand of *Adiantum vivesii* material as it had been described there in 1991 and 2000 (Possley et al. 2020, p. 6). These results suggest that *Adiantum vivesii* is extirpated from the only known location.

## **Taxonomy**

*Adiantum vivesii* was believed to be a fern of the family Pteridaceae. It was described by Dr. George R. Proctor in 1985, from specimens collected by Miguel Vives and William Estremera at San Antonio Ward in the municipality of Quebradillas (Proctor 1989, p. 140). Non-genetic research on *Adiantum vivesii* after it was described as a species suggested this fern is a single sterile hybrid plant, rather than a population of individuals of a species (Sepúlveda-Orengo 2000, entire). Excavations at different points throughout the entire “population” of *Adiantum vivesii* found rhizome, or underground stem, connections between most of the apparent individual ferns (Sepúlveda-Orengo 2000, p. 21). Plantings of two 10-centimeter (4-inch) rhizome segments (planted in pots using the same soil from the colony location) of *Adiantum vivesii* grew into healthy plants within about 3 months (Sepúlveda-Orengo 2000, p. 21). Production of sporangia (structures from which the reproductive gametophytes arise) was observed throughout the year, but actual gametophytes (structures containing sperm and eggs, or gametes) were not observed. The lack of gamete production but growth of fronds from rhizome segments suggests that the *Adiantum vivesii* “population” consists of only one individual with rhizome proliferations (below-ground stems).

A morphometric analysis of *Adiantum vivesii* and the co-occurring species, *Adiantum tetraphyllum*, was conducted on 21 vegetative characters and one spore character (Sepúlveda-Orengo 2000, p. 22). In conjunction with the morphometric analysis, the following studies of *Adiantum vivesii* and *Adiantum tetraphyllum* were conducted: chromosome counts; light microscopy observations of fresh or dried pinnules, sori, and sporangia; and scanning electron

microscopy (SEM) of rhizomes, fertile pinnules, and spores. The morphometric analysis showed significant differences between *Adiantum vivesii* and *Adiantum tetraphyllum* for 16 of the vegetative characters as well as spore size, revealing that *Adiantum vivesii* is morphologically different. Based on the results, the morphological features that best distinguish *Adiantum vivesii* from *Adiantum tetraphyllum* are the number of lateral pinnae and the number of pinnules on each lateral pinna, which are fewer in *Adiantum vivesii*. Although there are morphological differences, chromosome number in each taxon appears to be similar (Sepúlveda-Orengo 2000, p. 23), indicating *Adiantum vivesii* is not a polyploid (possesses more than two sets of chromosomes), a common cause of sterility in plants.

Based on spore observations in the light microscopy and SEM studies, *Adiantum vivesii* appears to be a sterile hybrid (Sepúlveda-Orengo 2000, p. 31). The greater variation in spore size in *Adiantum vivesii* observed in these studies was mainly produced by spore abortion. These observations of sori containing abortive sporangia and spores suggested *Adiantum vivesii* is indeed a hybrid (Sepúlveda-Orengo 2000, p. 29). Further, the forms of the spores of *Adiantum vivesii* are different from *Adiantum tetraphyllum* because of the collapse of the exospore (outer layer of the spore membrane) that is associated with the absence of the protoplast (plant cell with no cell wall). Mature spores of *Adiantum vivesii* are more compactly constructed than those of *Adiantum tetraphyllum*, with the sporangia appearing as more or less globular objects tightly grouped together, which is consistent with the sorus (spore-producing structure) of a hybrid (Sepúlveda-Orengo 2000, p. 28).

Based on the initial taxonomic analysis discussed above, *Adiantum vivesii* does not appear to be a distinct species (Sepúlveda-Orengo 2000, entire). This analysis showed that sporangia and spores were produced throughout the year, but signs of sexual reproduction as gametophytes or small plants were not observed. The plant instead reproduces vegetatively (asexually), and the entire colony seems to be the result of vegetative reproduction via rhizomes from a single, sterile individual (Sepúlveda-Orengo 2000, pp. 26–31).

More recently, the Fairchild Tropical Botanical Garden (Fairchild) has collaborated with the Service on the assessment of endangered ferns including *Adiantum vivesii* (Possley and Lange, 2016 and 2017, p. 4; Possley et al. 2020, pp. 5–11). In 2017, fieldwork was conducted to assess the colony of *Adiantum vivesii* and collect material for genetic analyses. Fairchild engaged Dr. Emily Sessa from the University of Florida (UF) to assist on a genetic study to validate whether *Adiantum vivesii* is a hybrid as indicated by Sepúlveda-Orengo (2000, p. 29).

Leaf material for DNA extraction was collected in the field in Puerto Rico in February 2017, and from herbarium specimens, including the isotype (duplicate or very similar type specimen) for *Adiantum vivesii*. A total of 27 specimens from the genus *Adiantum* were sampled from the field and herbarium specimens (all material of *Adiantum vivesii* was from herbarium specimens): 5 identified as *A. latifolium*, 2 as *A. obliquum*, 3 as *A. petiolatum*, 4 as *A. pyramidale*, 5 as *A. tetraphyllum*, 4 as *A. vivesii*, and 4 unidentified *Adiantum* individuals (Possley et al. 2020, p. 6).

The analysis found that five samples, including the *Adiantum vivesii* isotype, had sequence variants that fell in different groups, which indicate their hybrid origin (Possley et al. 2020, p. 10). The genetic sequencing further indicates that *Adiantum vivesii* is of hybrid origin with *Adiantum petiolatum* as one parent and the other parent likely being *Adiantum tetraphyllum* (Possley et al. 2020, p. 10).

The Act and supporting regulations define a species as any species or subspecies of fish, wildlife, or plant, and any distinct population segment of any vertebrate species that interbreeds when mature, but do not further define the terms “species” or “subspecies” used in this definition. Rather, per 50 CFR 424.11(a), the Service shall rely on standard taxonomic distinctions and the biological expertise of the Department of the Interior (Department) and the scientific community in determining whether a particular taxon or population is a species for the purposes of the Act. The standard biological definition of a “species” is a group of organisms that are capable of interbreeding when mature. The application of this definition becomes more

complicated with plant species, as many can exhibit asexual reproduction (NRC 1995, p. 50). For this reason, we consulted with experts to assist in determining the appropriate treatment for this entity (Riibe 2020, pers. comm.; Sessa 2020, pers. comm).

Based upon expert input, here we are considering a species to be a distinct unit with a natural evolutionary trajectory, meaning that it has the ability to establish a lineage that could be lost to extinction (NRC 1995, p. 54; Riibe 2020, pers. comm.; Sessa 2020, pers. comm.). In the case of *Adiantum vivesii*, it was determined to be a sterile hybrid by Sepúlveda -Orengo (2000, entire), indicating that *Adiantum vivesii* is unable to sexually reproduce and is unlikely to perpetuate into the future. This research also demonstrated that the only known population was comprised of clonal individuals resulting from rhizome proliferations, some of which eventually fragmented.

Despite the extensive botanical research and inventories in Puerto Rico by the late Dr. George Proctor (former authority on ferns across the Caribbean) and other experts, *Adiantum vivesii* remains only known from the type locality. Additionally, during the latest field surveys at the type locality (2017), the Fairchild team was unable to locate material that morphologically matched the type specimen (despite similarities), nor any clonal stand of *Adiantum* material as described by Proctor and Sepúlveda -Orengo (Possley et al. 2020, p. 6). The team collected a variety of morphotypes from the type locality for genetic sequencing at the University of Florida; however, none of the material was a genetic match to *Adiantum vivesii*. These results suggest that *Adiantum vivesii* is extirpated from the only known location. Recent research has confirmed that *Adiantum vivesii* is a sterile hybrid that does not have the capacity to establish a lineage that could be lost to extinction (Possley et al. 2020, pp. 6–10). Consequently, we have determined that *Adiantum vivesii* does not qualify as a listable entity under the Act; the original data used at the time the entity was classified were in error; and thus *Adiantum vivesii* should be delisted.

### **Summary of Comments and Recommendations**

In the proposed rule published in the *Federal Register* on July 30, 2021 (86 FR 40996),



we requested that all interested parties submit written comments on our proposal to delist *Adiantum vivesii* by September 28, 2021. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. Newspaper notices in both Spanish and English inviting general public comment were published in El Nuevo Día on July 31, 2021. We did not receive any requests for a public hearing nor any substantive information during the comment period.

In addition, in accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we solicited expert opinion from eight knowledgeable individuals with scientific expertise that included knowledge of ferns and plant taxonomy. The selected experts were asked to help us identify any oversights, omissions, and inconsistencies; provide advice on reasonableness of judgments made from the scientific evidence; help us ensure that scientific uncertainties are identified and characterized; provide advice on the overall strengths and limitations of the scientific data used in the document; and inform us of any scientific information that we did not use. We received no responses from any of the peer reviewers.

During the comment period, we received four comments from the public on the proposal to delist *Adiantum vivesii*. We did not receive any comments from the Commonwealth of Puerto Rico or Federal agencies. All comments are posted at <https://www.regulations.gov> under Docket No. FWS-R4-ES-2020-0125.

Some public commenters did not state whether or not they support the delisting; others did not support delisting, but did not provide any evidence that *Adiantum vivesii* was actually a listable entity. Commentors mostly supported keeping *Adiantum vivesii* on the List in order to preserve its habitat even though it does not qualify as a listable entity and the original data used at the time the entity was classified were in error. One commentor further stated that the entity's midvein, which makes the leaf asymmetric, and its low number of pinnae give *Adiantum vivesii*

unique morphological features. We acknowledge that *Adiantum vivesii* has unique morphological features; however, this fact, in and of itself, does not indicate that the entity is listable under the Act or that the original data used at the time the entity was classified were valid. The Act and supporting regulations define a species as any species or subspecies of fish, wildlife, or plant, and any distinct population segment of any vertebrate species that interbreeds when mature. Because the Act did not further define “species,” in our proposed rule, we considered a species to be a distinct unit with a natural evolutionary trajectory, meaning that it has the ability to establish a lineage that could be lost to extinction (NRC 1995, p. 54; Riibe 2020, pers. comm.; Sessa 2020, pers. comm.). As *Adiantum vivesii* is a sterile hybrid that does not have the capacity to establish a lineage that could be lost to extinction, we have determined that the entity does not qualify as a listable entity under the Act and the original data used at the time the entity was classified were in error. None of the commenters provided information to dispute this.

### **Delisting Determination**

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for adding species to, removing species from, or reclassifying species on the Lists of Endangered and Threatened Wildlife and Plants. Our regulations at 50 CFR 424.11 identify three reasons why we might determine that a listed species is neither an endangered species nor a threatened species: (1) The species is extinct; (2) the species has recovered, or (3) the original data used at the time the species was classified were in error.

Under section 3 of the Act and our implementing regulations at 50 CFR 424.02, a “species” includes any subspecies of fish or wildlife or plant, and any distinct population segment of any species of vertebrate species which interbreeds when mature. As such, a species under the Act may include any taxonomically defined species of fish, wildlife, or plant; any taxonomically defined subspecies of fish, wildlife, or plant; or any distinct population segment of any vertebrate species as determined by us per our Policy Regarding the Recognition of District

Vertebrate Population Segments Under the Endangered Species Act (61 FR 4722; February 7, 1996).

Our implementing regulations provide further guidance on determining whether a particular taxon or population is a species or subspecies for the purposes of the Act; under 50 CFR 424.11(a), the Service shall rely on standard taxonomic distinctions and the biological expertise of the Department and the scientific community in determining whether a particular taxon or population is a species for the purposes of the Act. For listing determinations, section 4(b)(1)(A) of the Act mandates that we use the best scientific and commercial data available for each species under consideration. Given the wide range of taxa and the multitude of situations and types of data that apply to species under review, the application of a single set of criteria that would be applicable to all taxa is not practical or useful. In addition, because of the wide variation in the kinds of available data for a given circumstance, we do not assign a priority or weight to any particular type of data, but must consider it in the context of all the available data for a given species.

To determine what constitutes a listable entity under the Act, we evaluate and consider all available types of data, which may or may not include genetic information, to determine whether a taxon is a distinguishable species or subspecies. As a matter of practice, and in accordance with our regulations, in deciding which alternative taxonomic interpretations to recognize, the Service rely on the professional judgment available within the Service and the scientific community to evaluate the most recent taxonomic studies and other relevant information available for the subject species. Therefore, we continue to make listing decisions based solely on the best scientific and commercial data available for each species under consideration on a case-by-case basis.

In making our determination whether *Adiantum vivesii* is a listable entity, we considered all available data that may inform the taxonomy of *Adiantum vivesii*, such as ecology, morphology, and genetics, as well as expert opinion (Riibe 2020, pers. comm.; Sessa 2020, pers.

comm). Here, we considered the ability of an entity to establish a lineage that could be lost to extinction in our determination of whether the species constitutes a listable entity.

After a review of all information available, we determined to remove *Adiantum vivesii* from the List of Endangered and Threatened Plants at 50 CFR 17.12. Since the time of listing, additional studies have shown that *Adiantum vivesii* is not a distinct species, but rather a sterile hybrid with rhizome proliferations that lacks the ability to establish a lineage that could be lost to extinction. As a result, we have determined that *Adiantum vivesii* was listed based on data or interpretations of data that were in error and that the entity is not a listable entity under the Act; therefore, we are delisting it.

#### *Determination of Status*

Our review of the best available scientific and commercial information available indicates that *Adiantum vivesii* is not a valid taxonomic entity and that original data for classification of *Adiantum vivesii* when it was listed was in error. Therefore, we are removing *Adiantum vivesii* from the List of Endangered and Threatened Plants. *Adiantum vivesii* does not require a post-delisting monitoring plan because the requirements for a monitoring plan do not apply to species that are delisted for not meeting the statutory definition of a species because the original data for classification were in error.

#### **Effects of This Rule**

This rule revises 50 CFR 17.12(h) by removing *Adiantum vivesii* from the Federal List of Endangered and Threatened Plants. On the effective date of this rule (see **DATES**, above), the prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, will no longer apply to *Adiantum vivesii*. Federal agencies will no longer be required to consult with the Service under section 7 of the Act in the event that activities they authorize, fund, or carry out may affect *Adiantum vivesii*. There is no critical habitat designated for *Adiantum vivesii*, so there will be no effect to 50 CFR 17.96.

## **Required Determinations**

*National Environmental Policy Act (42 U.S.C. 4321 et seq.)*

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*), need not be prepared in connection with determining a species' listing status under the Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244).

*Government-to-Government Relationship with Tribes*

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We have determined that there are no Tribal lands that may be affected by this rulemaking.

## **References Cited**

A complete list of all references cited in this rule is available at <https://www.regulations.gov> at Docket No. FWS-R4-ES-2020-0125, or upon request from the Caribbean Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

## **Authors**

The primary authors of this rule are the staff members of the Fish and Wildlife Service's

Species Assessment Team and the Caribbean Ecological Services Field Office.

### **List of Subjects in 50 CFR Part 17**

Endangered and threatened species, Exports, Imports, Plants, Reporting and recordkeeping requirements, Transportation, Wildlife.

### **Regulation Promulgation**

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

### **PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS**

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

### **§ 17.12 [Amended]**

2. In § 17.12, paragraph (h), amend the List of Endangered and Threatened Plants by removing the entry for “*Adiantum vivesii*” under FERNS AND ALLIES.

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**Martha Williams,**  
*Director,*  
*U.S. Fish and Wildlife Service.*

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